Result Page

The invention relates to a dishwasher after the generic term of the claim 1.

The table-ware arranged in a Spülraum of a dishwasher becomes during a cleaning course and/or a one possibly. to it following clear rinsing process by the high temperature of the cleaning and/ or. Clear rinsing liquid heated, which removes liquid evacuated and in the drying phase the humidity contained in the rinsing space atmosphere by condensation at cooler surfaces of the Spülraums. With this drying method it can however hardly be avoided that after the cooling remainder drops stick to the table-ware.

In the DE 37 41 652 A1 a dishwasher is described, with which the drying procedure is accomplished in a closed system. The damp air of the Spülraums is led across a conduit to one outside of the Spülraums and thermally by this isolated arranged latent heat storage. It cools down in the latent heat storage, whereby the water contained in it condenses and thus its relative humidity removes. Air is led back by a further conduit again to the Spülraum. The disadvantage of this drying process is to the one the machine and constructional expenditure. The Spülraum must be broken through with conduits. Is necessary a blower, in order to lead the air of the Spülraums in the cycle. Further an additional heating element is intended in the conduit leading from the latent heat storage to the Spülraum, in order to achieve an optimal drying process. A further disadvantage is the additional power requirement for the enterprise of the blower as well as the heating.

Further a dishwasher of the kind in speech is well-known from the DE 44 03 737 A1, whose latent heat storage between the heat flow circles of a heat exchanger is embedded.

From the DE 33 16 716 A1 a dishwasher with rinsing container is well-known, with which the rinsing container rear wall is trained by chilled water double-walled as a container for the receptacle. In the case of a filling of the container a heat emission takes place from the rinsing container to tank capacity by means of the rinsing container rear wall working then as heat conducting surface.

The invention is the basis the task to create a dishwasher the drying process of the table-ware particularly good under small energy and technical expenditure made possible.

The solution of this task of according to the invention is to be inferred from the characterizing portion of the claim 1.

Afterwards at least one part of the rinsing space wall exterior stands under span of an intermediate layer with a latent heat storage in laminar heat contact. The intermediate layer is heat conducting, otherwise however essentially thermal during a drying phase for drying a Spülgutes arranged in the Spülraum isolating. In this way a heat crossing from the Spülraum takes place to the latent heat storage only during the drying procedure, without for it special conduits or a blower would be necessary. In technical regard is this arrangement favourable, because for dishwashers, for which such a condensation of the humidity contained in the rinsing space atmosphere is intended, no special, approximately rinsing space containers provided with connective openings for conduits must be planned. Rather usual rinsing space containers inserted can become, at their exterior a according to invention, essentially from intermediate layer and latent heat storage existing arrangement arranged become. For the change of the heat permeability the intermediate layer z can. B. a cavity exhibit, which is evacuated during the cleaning phase and is filled with a liquid evaporated during the drying phase.

Preferring way is designed the intermediate layer as an intermediate vessel, which with a first side, i.e. its photograph side, with which rinsing space wall exterior and with a second side, i.e. its delivery side, with which exterior the latent heat storage of contained storage container in laminar heat contact stands. The intermediate vessel is connected with the Dampfraum of a storage vessel heatable during the drying phase and contains the steam of this liquid. The heat conductivity of the intermediate layer and/or. the intermediate vessel during the drying phase it can be changed on completely simple way by the fact that the liquid in the storage vessel one evaporates. The quantity of the liquid in the storage vessel can be very small held thereby, so that little energy is necessary, in order to evaporate the liquid. In this way the steam pressure becomes and/or. the quantity of steam in the intermediate vessel increases. This has to the sequence that the heat conductivity of the intermediate layer increases. The steam pressure in the intermediate vessel amounts to preferably thereby 0.1 to 1 bar. As soon as the liquid in the container or on the temperature of the approaching fresh water cooled ambient temperature down, naturally the steam pressure drops both in the Dampfraum of the supply container and in the intermediate vessel. Accordingly the heat conductivity of the intermediate layer is reduced, so that the latent heat storage is thermally separate from the Spülraum during the cleaning phase. Preferably a liquid is selected, with which the steam pressure amounts to after the cooling of the liquid on ambient temperature at the most one fifth of the steam pressure with warmed up liquid.

Because the storage vessel is underneath the intermediate vessel and the intermediate vessel at a side panel of the Spülraumes arranged, is ensured that in the intermediate vessel condensed steam can back-arrive if necessary as liquid into the storage vessel, without for it special promotion devices would be necessary.

In the intermediate vessel alone a steam can be present. In addition, it is appropriate, if in it steam air is contained a mixture. In this case it is not necessary to evacuate the container

completely. It is sufficient, if air from the intermediate vessel only partly removes and the distant amount of air at least partly by the o. g. Steam is replaced. The transformation temperature of the latent heat storage preferably lies between 23 DEG C and 35 DEG C. Thus a temperature level sufficient for the condensation of humidity is ensured. As latent heat storages such materials can completely generally be used, which change their phase or their modification in the temperature range mentioned. Preferably as heat accumulator substance calcium chloride x H2O is used.

A particularly good transfer of heat between Spülraum and latent heat storage during the drying phase is reached if a liquid is selected, their steam at the delivery side of the intermediate vessel condensed and at the photograph side of the intermediate vessel evaporated. At the photograph side usually temperatures between 50 DEG C and 70 DEG C prevail during the drying phase.

The evaporation energy taken up at the photograph side is transferred in the form of condensation energy to the delivery side the latent heat storage. In such trap however a liquid promotion device must be present, in order to transport the condensate resulting at the delivery side the photograph side within the intermediate vessel. Such a liquid transport can be achieved on simplest way by a capillary liquid promotion device.

The sinking of the steam pressure and the associated isolation effect of the intermediate layer and/or. the intermediate vessel it can by the fact be increased that the storage vessel is coolable by an Peltier element approximately. The steam pressure in the intermediate vessel can be substantially reduced thereby. Accordingly the isolation effect of the intermediate vessel is increased. The cooling can take place with relatively small energy expenditure, because on the one hand only a small liquid quantity is present in the storage vessel and is lock offable on the other hand the storage vessel by a non-return valve of the intermediate vessel. A unique brief cooling is thus sufficient. During the cleaning phase no cooling is necessary. The very low steam pressure in the intermediate vessel is kept upright by the closed non-return valve.

The invention is more near described now on the basis embodiments represented in the attached designs. Show:

Fig. 1 a schematic partial representation of the Spülraums of a dishwasher with a condensation mechanism according to invention arranged to it,

Fig. 2 a representation in accordance with Fig. 1, with an intermediate vessel with a liquid promotion device, and

Fig. 3 an execution variant to Fig. 1, with a coolable storage vessel and a feeder line between storage vessels and intermediate vessels, lock offable by a valve.

Fig. 1 shows the ausschnittsweise Spülraum 1, which is circumscribed by a rinsing space wall 2.

At the rinsing space wall exterior a flat container, an intermediate vessel 3 arranged is lateral. The intermediate vessel is a flat, quaderförmiger container, which is connected with a flat side with the exterior of the rinsing space wall 2. With that sand yield-like a further container is, i.e. a storage container 4 connected for the Spülraum 1 turned away flat side of the intermediate vessel. The storage container 4 is with a latent heat storage 5, z. B. Calcium chloride x H2O, filled. With the intermediate vessel 3 a storage vessel 7 is fluid connected by a feeder line 6. The feeder line 6 flows into the lower narrow side of the intermediate vessel and/or. in its floor 8. The storage vessel 7 is partly filled with a liquid 9. Above the liquid 9 a Dampfraum 10 is present, into which the feeder line 6 with their flows to end. The container 7 is by one for instance at its floor arranged heating 13 heatable.

A dishwasher according to invention works as follows: During the cleaning phase the heating is not 13 in enterprise. The liquid 9 exhibits therefore one the ambient temperature appropriate temperature. If necessary the storage vessel can be washed around by inflowing fresh water also. In this case the temperature corresponds to the liquid 9 of the temperature of the fresh water. At the temperatures mentioned the steam pressure of the liquid 9 is so low that in the intermediate vessel 3 an accordingly low steam quantity is present, so that the intermediate vessel works approximately like an evacuated isolation cavity. 14 taken up and to the opposite side of the intermediate vessel, i.e. at its delivery side 15 transported heat energy, standing with the rinsing space wall 2 directly in contact, by steam at the side of the intermediate vessel 3, at its photograph side, is due to the small number of steam molecules small.

To beginnings of the drying phase the storage vessel 7 with the help of the heating 13 is heated. The temperature of the liquid 9 rises, with the sequence that more steam forms appreciably, which arrives over the feeder line 6 into the intermediate vessel 3. Accordingly also the steam pressure in the intermediate vessel rises to a multiple, preferably to 10 to 100fache of the initial value. Due to the very high number of steam molecules now the transfer of heat from the photograph side is 14 increased to the delivery side 15 substantially. Accordingly the inside of the rinsing space wall 2 standing with the photograph side 14 in contact cools and the humidity down contained in the rinsing space atmosphere can to it condense. As evaporatable liquid 9 a variety of different liquids is applicable. Favourable way is used however water, since it does not prepare cheap, only little aggressively and with the disposal of the dishwasher regarding environmental protection problems.

With in Fig. 2 represented embodiment is in the intermediate vessel 3 a capillary liquid promotion device 16 arranged. It can concern here approximately a paper-similar fleece, which extends at least partly the photograph side 14 of the intermediate vessel 3 covered and up to its floor 8. The liquid 9 is a liquid, whose steam delivery-laterally condensed and which evaporates at the admission-laterally dominant temperatures however again. Preferably water is used. By the liquid promotion device 16 run liquid can to be absorbed and to the photograph side 14 transported at the delivery side 15 condensed and to the floor 8. In this way can heatdepressed through the intermediate vessel and/or. its heat conductivity to be increased.

A further embodiment shows Fig. 3. The feeder line 6 is here lock offable by a non-return valve 17. The container 7 is coolable, approximately by an Peltier element arranged at its floor 18. The non-return valve 17 is operatable over electromagnets 19. The isolating effect of the intermediate vessel 3 can be increased by this arrangement. As the liquid 9 in the container is cooled down on temperatures lying underneath the ambient temperature, the steam pressure can be lowered in the Dampfraum 10 of the storage vessel 7 and in the intermediate vessel 3 still further. The number, of heat energy-transferring steam molecules is further reduced and accordingly the isolating effect of the intermediate vessel 3 increased thereby.

The cooling of the liquid 9 must be kept upright only until the desired low steam pressure is reached. Then the non-return valve 17 can be closed and thus from the storage vessel 7 enclosed volumes from the limited volume of the intermediate vessel 3 be fluid separated. While it is in this way in still higher measure ensured the cleaning phase that only little heat energy can arrive at the latent heat storage 5 and cause a phase conversion there. The latent heat storage 5 has to work thus during the drying phase still sufficient heat photograph capacity over as heat sink. After finished drying procedure the latent heat storage 5 delivers the stored warmth to the environment and transforms thereby again into its output modification and/or. - phase back. This applies to all embodiments.

Finally it is noticed that a capillary liquid promotion device also with the embodiment in accordance with Fig. 3 to be present can do.